

**NOTES ON SCIENCE AND INDUSTRY.**

It is predicted by a writer in the London Economist that Canada will eventually control the shipbuilding industry, and this from a remarkable fact of only recent realization. It is now practically proved, he argues, that steel mixed with from three to five per cent. of nickel is double the strength of ordinary steel, and as it does not corrode or take on barnacles, ships constructed of it will possess the very great advantage of never requiring to be scrapped. Moreover, as ships of nickel—steel may safely be built much lighter than those of ordinary steel, the reduction in weight

and consumption of coal may be safely reduced without diminution of speed. In short, according to this writer, such steel seems bound to supersede the ordinary article, and probably also all other materials in present use in ship construction; and this being the case, the nation which is in a position to produce this metal must necessarily control the shipbuilding industry. For the present, at least, there is no considerable supply of nickel outside of Canada, which in fact possesses nickeliferous pyrites without limit the entire bleak region extending

The plan which has for some time past been under way in Russia of introducing metal sleepers upon all the railways in that country is regarded with no little interest there and elsewhere, as indicating a decided advance in engineering enterprise. An experiment in this line

While a good supply of native make was in most respects satisfactory, the only drawback in fact being the cost involved. The plan has failed, however, because, upon quite an extensive scale, the country has not been able to place by the government with native makers for a large supply. It is believed that if the trials should result in a general adoption of metal sleepers an enormous impetus will be given to Russian metallurgical industry, as some thirteen million out of sixty million wooden sleepers are now yearly renewed.

perior appearance and permanency the right article has long been sought, and, to meet this want, M. Mazure now proposes a fluid, of which the following is the formula: One part bismuth chloride, two parts mercury bichloride, one part copper chloride, six parts hydrochloric acid, five parts alcohol, and fifty parts water, these being of course well mixed. To use this preparation successfully, the article to be blacked or grained being first made up to the proper size, it is supplied with a swab or brush, or bottom

still, the object may be dipped into the liquid is allowed to dry on the metal, and the latter is then placed in boiling water, the temperature being maintained for half an hour. If, after this, the color is not so good as desired, the same operation is simply to be repeated, and the result is of the highest degree satisfactory. After obtaining the desired degree of color the latter is fixed as well as much improved generally by placing for a few minutes in a bath of boiling oil, or by coating the surface with oil and heating the object until the oil is completely driven off. The

A recent improvement in the construction of warp knitting machines is likely to be regarded with considerable favor—its practicability, at least, being no slight consideration in its behalf—consisting simply in the application of tension rollers mounted on the traverse carriages of the machine; that is, the threads are caused to pass from the ordinary bobbin on the traverse carriages of the machine beneath the tension rollers.

But, in view of such a weight, as to be raised by the threads, which are suspended beneath it. On the frame of the traverse carriages are formed arms or brackets which are provided with slots, and act as supports for the tension rollers, allowing them to be suddenly raised as the threads are drawn on the needles, and then to remain temporarily suspended on the threads for the purpose of taking up the loose threads later. Thus the irregularities caused by the threads are compensated by the tension roller instead of occasioning sudden, intermittent drawing off from the bobbins.

A very notable achievement in metal working processes was announced lately by the velocipedes car company of Three Rivers, Mich., in the production of the wheels for handcars from a single sheet of steel, thus greatly simplifying the operation, with decided advantages in the result. A sheet of proper thickness to insure sufficient strength is sheared to circular shape, and, passing through a series of formative processes, is brought to the desired shape, the centre being corrugated for the purpose of securing increased stiffness. A hub, drop forged

It is asserted that by the new, or Dalzel, process of treating steel, any of the ordinary steels of the usual lengths and shapes for making tools, punches, and dies will, when treated, become so soft as to effect a very material saving in the cost of producing the desired tool. After

having been softened and cut to the required form, the steel is handled in precisely the same manner as any of the well-known sorts, and it is claimed that the process in no way interferes with the chemical composition of the metal, but that it is merely a means to insure the qualities mentioned. In proof of this, the Jessep-steel which had been duly softened was made into a punch to cut a five-pointed star, seven-eighths of an inch in diameter and unusually sharp at the points, the result showing that in the making of this punch there was a saving of about

pered in the usual way in water, then forced through German silver 3.32 inches thick, also through wrought iron 3.16 inches thick, and as a final test was forced through metal which cut only a part of the star, thus giving an unbalanced pressure tending to bend the punch. It underwent a series of tests in this unusual way, passing from one test to another more severe, the tool coming out at last as perfect as when it originally left the maker's hands.

**The merits of a new coke furnace of novel and**

Interesting instructions have been the subject of considerable investigation by engineers abroad—an invention which, from the various accounts published in the foreign journals, would seem likely to create a decided departure from the usual routine of the coke-making industry. It is described as a new retorting furnace, capable of producing coke from inferior qualities of coal, inferior in quality to what has generally been used for the purpose, and, in the matter of cost, the new method is said to show an economy of fifty cents per ton as compared with the cost required

In some of the large business and manufacturing establishments in Boston there has lately been introduced a system of furnaces for stationary boilers which, it is claimed, goes far toward solving the problem of securing nearly, if not quite, complete combustion and an almost imperceptible amount of smoke. The arrangement is based on the principle of forcing the

gent is that the Williams process is a dry process, and that in the action of the furnace about one hundred and fifty cubic feet of air at atmospheric temperature are the absolute equivalent for the combustion of one pound of coal, one-third, or fifty cubic feet, of which is taken up by the gas, and two-thirds, or one hundred cubic feet, by the coke. From this it follows that, to insure combustion and prevent smoke, it is not only essential that there should be a good draught, as generally understood—that is, through the grates and up the chimney—but the gases arising from the ignited coal must be sup-

pplied with oxygen from a source above the grates. To this end a number of jets of superheated steam are admitted in the furnace over the grate, and with them is carried a supply of external air by induction, which is delivered in the midst of the combustible gases. The superheated steam is instantly converted into its elements, oxygen and hydrogen, and with the air it has drawn into the furnace is intermingled with the combustible gases arising from the coal, thereby their combustion is **effectively** preventing smoke.

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